1st Year Course Structure and Syllabus | Mechanical Engineering: (2018-19) Batch

Assam Science and Technology University

Jorhat Engineering College, Jorhat, Assam - 785007

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1. COURSE STRUCTURE

1.1 Course Structure of B. Tech 1st Semester

SEMESTER-1

Sl. No.	Course Code	Course Title	L	T	P	Credits
1	CY181101	Chemistry	3	1	0	4
2	MA188102	Mathematics-1	3	1	0	4
3	CS188106	Programme solving through	2	0	2	3
4	EE 188107	Basic Electrical Engineering	3	0	0	3
5	HS 188108	Communication and professional skills	1	0	2	2
6	CY181111	Chemistry -101	0	0	2	1
7	EE 188117	Basic Electrical Engineering Lab	0	0	2	1
		Total	12	2	8	18
		Total contact hour per week 22				

1.2 Course Structure of B. Tech 2nd Semester

SEMESTER-II

Sl. No.	Course Code	Course Title	L	T	P	Credits
1	PH181201	Physics-201	3	1	0	4
2	MA181202	Mathematics-II	3	1	0	4
3	CE181103	Engineering Graphics and	1	0	4	3
4	ME181104	Engineering Mechanics	3	0	0	3
5	HS181105	Sociology	2	0	0	2
6	PH181211	Physics-201 Lab	0	0	2	1
7	ME181114	Engineering Mechanics Lab	0	0	2	1
8	ME181216	Workshop	0	0	4	2
		Total	12	2	12	20
		Total contact hour per week 22				

2. SYLLABUS

2.1 Syllabus of B. Tech 1st Semester

COURSE : CHEMISTRY-101
Course Code : **CY181101**
Credit : **4**
L-T-P : 3-1-0
SEE : 100 Marks

Detailed Syllabus

Module	Details of Module	No. of Lectures
1	Atomic Structure :Schrodinger's wave equation, Physical significance of Ψ and Ψ^2, Hydrogen atom wave Functions-Radial and Angular wave function, Eigen value, Eigen function, Molecular orbital theory-electronic configurations of molecules in terms of the MO-Homonuclear diatomic molecule, Heteronuclear diatomic molecule. (Eg. CO, NO)	5
2	Polymer Chemistry: Classification, Functionality, Determination of molecular weights, Polydispersity index (PDI). Types of polymerization (Addition and Condensation). Structure-property-application of few commodity polymers (eg. PE, PP, PS, PMMA, PVC, Isoprene), Biopolymer-properties and its applications (polylactic acid), Conducting polymer-properties and its applications (polyacetylene).	6
3	Nano-chemistry: Introduction, Synthesis of nanomaterials (Top-down and Bottom-up approach). Fullerenes, Carbon nanotube (Characteristic, properties & application), Nanowire, Application of Nanomaterial in catalysis, Medicine, Energy science, Bio nanomaterials.	5
4	Sustainable Chemistry: Principles of green chemistry, Idea of green synthesis, Carbon footprint and sequestration, Carbon trading. Brief idea of alternative solvents–Water, ionic liquids, supercritical fluid system (Carbon dioxide), Waste management: Solid, electronic & industrial wastes, Waste management procedures and relevant standards.	6
5	Corrosion Science: Definition and scope of corrosion. Dry chemical corrosion and electrochemical corrosion and their mechanisms. Types of electrochemical corrosion (Differential aeration, Galvanic, Concentration cell), Typical electrochemical corrosion like Pitting, Inter-granular, Waterline. Factors affecting corrosion, Protection against corrosion.	6

6	Instrumental Methods of Chemical Analysis: Spectroscopy: Principle of spectroscopy, Principle and applications of UV-Visible spectroscopy. Applications of Flame photometry, Atomic absorption spectroscopy, Infrared spectroscopy, NMR spectroscopy, Mass spectroscopy. Principle and applications of different Chromatographic Techniques-Gas, HPLC, GPC.	8
7	Advanced Engineering Materials: Cement (Raw materials, chemical composition, setting and hardening of cement), Refractories (Classification and properties), Lubricants (Types of lubricants, Properties, Mechanism of lubrication).	6

Text Books/ Reference Books:

1. Engineering Chemistry-Jain & Jain (DhanpatRai& Company)
2. Engineering Chemistry-ShashiChawla (DhanpatRai& Company)
3. Industrial Chemistry-B. K. Sharma
4. A text book of Engineering Chemistry-Dr S. Rattan
5. Wiley Engineering Chemistry
6. Atomic Structure and Chemical bond-Manas Chandra (TMH edition)
7. Quantum Chemistry-B.K. Sen
8. Quantum Mechanics-L. Pauling & E. Wilson (McGraw Hill Book Company)
9. Physical Chemistry-P. W. Atkins (Oxford University Press)
10. Advance Inorganic Chemistry- Cotton et. Al. (John Willey)
11. Inorganic Chemistry-Shriver, Atkins, Langford (ELBS)
12. Green Chemistry-Paul T Anastas, John C. Warner
13. Introduction to Polymers-R. J. Young
14. Polymer Science-V.R. Gowarikar (New Age International)
15. Fundamentals of Molecular Spectroscopy-C. N. Banwell& E. N. McCash
16. Atomic & Molecular Spectroscopy-Chatwal&Anand (Himalayan Publishing House)

COURSE : MATHEMATICS-I
Course Code : **MA181102**
Credit : **4**
L-T-P : 3-1-0
SEE : 100 Marks

Detailed Syllabus

Module	Details of Module	No. of Lectures
1	Calculus: Reduction formulae, applications of definite integrals to evaluate surface areas and volumes of solids of revolution, idea of improper integrals, Beta and Gamma functions and their properties.	8
2	Calculus: Successive differentiation, standard forms, Leibnitz's theorem (without proof), Taylor's and Maclaurin's theorem with remainders, indeterminate forms and L' Hospital's rule, Curvature and	8

	Radius of curvature (both in Cartesian and Polar co-ordinates).	
3	Sequences and series: Idea of convergence of sequence and series, Fourier series, Half range sine and cosine series, Parseval's theorem.	6
4	Multivariable Calculus: Partial derivatives, Euler's theorem, Total derivatives, Maxima, Minima and saddle points, Method of Lagrange multipliers, Double and Triple Integrals and its applications to find areas and volumes.	8
5	Linear Algebra: Inverse and rank of a Matrix, Linear independence of vectors, rank-nullity theorem, system of linear equations, Symmetric, skew-symmetric and orthogonal matrices, Eigen values and eigen vectors, Diagonalization of matrices, Cayley-Hamilton theorem (without proof), Orthogonal Transformation	10

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Reference Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

COURSE : PROBLEM SOLVING THROUGH PROGRAMMING USING C

Course Code : **CS181106**
Credit : **3**
L-T-P : 2-0-2
SEE : 100 Marks

Detailed syllabus

Module	Details of module	No. of Lectures
1	Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, system software, application software, compilers, interpreter etc. Idea of Algorithm: Steps to solve logical and numerical problems Representation of	3

	Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, compilation, object and executable code, Syntax and Logical Errors in compilation, storage of data inside program using variables, data types, modular programming, structure of a C program.	
2	Expressions and precedence: Writing C expressions using operators (arithmetic, relational, logical, dereferencing, arrow operator, period operator, conditional operator, subscript operator etc.), identifiers and literals, precedence of operators, evaluation of expressions using precedence and associatively rules.	2
3	Conditional Branching and Loops :Writing and evaluation of conditionals and consequent branching using if..else and switch.. case statements, Iteration and loops using for loop, while loop and do..while loop. Arrays (1-D, 2-D), Character arrays and C Strings.	4
4	Basic Algorithms : Searching (sequential and binary), Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definitions for asymptotic analysis required).	4
5	Function: User defined functions and built in libraries, function prototype, parameter passing in functions, call by value, passing arrays to functions: idea of call by reference (1-D and 2-D), scope rules for C language.	3
6	Recursion, as a different way of solving problems, example programs, such as Finding Factorial, Fibonacci series.	2
7	Structure: Structures, defining structures, Accessing members, Array of Structures.	2
8	Pre-processor Directives: #define, #include, #ifdef etc., conditional compilation.	1
9	Pointers: Idea of pointers, defining pointers, pointer and arrays, pointer to structure, pointer to function, passing addresses of variables to functions (elementary and user defined), double indirection, Use of Pointers in self-referential structures, dynamic allocation/deallocation of memory blocks data types like elementary data types, arrays, structures, accessing elements of dynamically allocated memory, notion of linked list (no implementation).	4

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. Yashavant Kanetkar, Let us C, BPB Publication
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
4. Yashavant Kanetkar, Understanding Pointers in C, BPB Publication
5.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Laboratory - Programming for Problem Solving Total: 26 contact hours, 2 hours of lab/week [to be evaluated for Continuous Evaluation (CE): 30 marks]

Detailed Syllabus

Lab No.	Laboratory	Lecture Hr
1	Familiarization with programming environment (editors, compilation, debugging etc.)	2
2	Simple computational problems using expressions and precedence	2
3	Problems involving using if-then-else and switch statements	2
4	Iterative problems e.g., sum of series, factorial, Fibonacci series etc.	4
5	1D, 2D Array manipulation: summation, finding odd/even in a set, string handling etc.	4
6	Matrix problems (addition, multiplication etc.), String operations (finding length, concatenation, comparing etc.)	4
7	Simple function illustrating the concepts, call by value	2
8	Recursive functions for summation, Fibonacci series, and factorial	2
9	Pointers, call by reference, passing arrays to functions, passing address of structure to function, passing array of structure to function, pointers and arrays, function pointer, dynamic allocation of block of memory and accessing the elements	4
10	File operations on text files, binary files	2

COURSE : BASIC ELECTRICAL ENGINEERING
Course Code : **EE181107**
Credit : **3**
L-T-P : 3-0-0
SEE : 100 Marks

Detailed Syllabus

Module	Details of module	No. of Lectures
1	DC Circuits: Definitions of active, passive, linear, nonlinear circuit elements and networks. Kirchoff's laws, nodal & mesh analysis, voltage & current sources, network theorems- superposition, Thevenin's, Norton's and maximum power transfer theorems.	8
2	AC Circuits: Waveforms of alternating voltages and currents, instantaneous, average and RMS values, form factor & peak factor, forms of representation of alternating quantities, concept of phasorphasor diagrams, Concept of lead & lag, reactance's& impedances, AC circuits-resistive, inductive, capacitive, RL, RC & RLC series, parallel and series parallel combination, impedance	12

	triangle, admittance, active & reactive power & power factor. Concepts of 3-phase AC, connections, phase & line values in star & delta connections, solutions of simple 3-phase balanced circuits with resistive & reactive loads, 3-phase power, and phase sequence	
3	Electrical Machines Single Phase Transformers: Principle of operation, EMF equation, losses and efficiency, Basic idea of an auto-transformer. DC machines: Electromechanical Energy Conversion, EMF and torque equations, Classification, characteristics and applications of various types of D.C. motors. Induction Motors: Principle of operation of single phase and three phase induction motors, Application of Induction motors	12
4	Instruments Classification of instruments, essentials of indicating type instruments- deflecting torque, controlling torque, damping; types of indicating instruments, MC & MI type ammeters & voltmeters, extension of range- use of shunt & multipliers.	4
5	Basics of Electrical Installations Basic knowledge of domestic wiring, types of cables (names only), types of wiring; circuit layouts- single phase AC mains to DB; 3 phase connections; accessories- main switch, ceiling rose, fuse, MCB etc. Earthing- purpose & methods.	4

Text/Reference Books:

1. Basic Electrical Engineering--- Nagrath.
2. Basic Electrical Engineering---Mittle.
3. B.E.E. Science—Sahadev & Rana.
4. Electro-Technology—H. Cotton.
5. A text book of Electro-technology- B. L. Theraja.

COURSE : COMMUNICATION AND PROFESSIONAL SKILL
Course Code : **HS181108**
Credit : **2**
L-T-P : 1-0-2
SEE : 100 Marks

Detailed Syllabus

Module	Module Details	No. of Lectures
1	Basic Communication: Concept and meaning of communication; Importance of communication, Objectives of communication, Process of communication, Characteristics of communication, Forms of communication, Barriers to communication, Communication Breakdown, Effective communication.	4
2	Audience Analysis: Audience awareness, Audience analysis, Types of audience, Importance of audience analysis, Audience Profile,	3

	Analysing individual and group of audience, Adapting message to audience.	
3	Job Oriented Communication: Introduction to soft skills, Antiquity of soft skills, Classification of soft skills, Combating stage fright, Pre-presentation preparation, Guidance for effective delivery, Creating and designing of Power Point slides, Presentation Delivery, Organizational group discussion, Group discussion as part of selection process, Conferences, Symposia and Seminars, Job Interview, Objectives of interviews, Types of interview, Ground work before interview, Internship and Campus placement.	5
4	Technical report writing: Concept of report writing, Importance of report, Characteristics of a report, Categories of report, Formats, Structure of a technical report, Planning, Drafting, Referencing and Styling.	4
5	Academic writing and Comprehension skills: Précis writing, Presenting Research paper and articles. Miscellaneous grammar.	3
6	Job oriented writing skill: Official letters- Formats, Types and Language, Memo writing, Emails, Resume and Curriculum Vitae-- the first step forward and Job application.	5

Text Books:

(i) Effective Technical Communication, M. Ashraf Rizvi. Tata McGraw Hill
(ii) Technical Communication: Principles and Practice, Meenakshi Raman and Sangeeta Sharma. OUP
(iii)Personality Development and Soft Skills, B.K.Mitra, OUP
(iv)Technical Communication for Engineers, S.Verma, VIKAS Publishing House Pvt. Ltd.

Language Laboratory: [*To Be Evaluated For Continuous Evaluation (Ce): 30 Marks*]

Objectives of the Practical Course:

1. Practical classes in the Language Lab on sounds of English language, its word stress and intonation and on the silent letters in English words attempt to neutralize the learner's accent drawing their attention to the wrong pronunciation commonly made by the non-native speakers while interacting in English and facilitate them to do better in telephonic interviews conducted in English and have good intelligibility between them and the teachers when they go abroad for higher studies in the medium of English language.

2. Practical classes on Communicative English, Essential English Grammar, Building Vocabulary, Common Errors in English and Reading and Listening exercises attempt to introduce the learners to speech mannerism both formal and informal, strengthen their grammatical knowledge of English, enrich their word stock, make them aware of common mistakes made by non- native speakers while interacting in English and develop their reading, comprehension and listening skills.

3. Interactive sessions in the lab such as Presentation, Group Discussion, JAM, Role Playing and Describe People/Object/Place work as ice-breaking activities, participation

in which enables the students to overcome their inhibitions while speaking; invigorate their presence of mind; enhance their critical focus; boost their confidence level; develop their team spirit, leadership quality and problem solving ability; hone their presentation skill and assist them to have effective communication in English (both verbal and non verbal) and be skilled in time management.

4. Writing home assignments with the aid of given guidelines gives the students the scope to enhance their writing skills in English and become aware of various societal issues and problems.

5. The Practical Course aims to develop the communicative skills of the students in English and make a growth of different facets of their personalities to enable them to fare better and have dynamic sustenance in today's academic, social and professional lives.

Detailed Syllabus

Module	Module Details	No. of Lectures
1	Computer/ software aided lessons for practical classes: 1. Pronunciation: Vowels, Diphthongs and Consonants sounds, Stress and Intonation and Silent Letters in English words. 2. Communicative English - Exercises on situational dialogues/ role play in both formal and informal contexts. 3. Essential English Grammar 4. Building Vocabulary – synonyms, antonyms and phrases and idioms 5. Common Errors in English 6. Developing reading, comprehension and listening skills with the aid of language lab devices of reading and listening exercises.	28
2	Activities/ Interactive sessions for practical: 1. Paper Presentation (Manuscript/ Power Point) 2. Group Discussion 3. Just a Minute' Session (JAM) 4. Role Playing 5. Describing Object/People/Place.	20
3	Home Assignments: Each student has to submit two home assignments following the guidelines given with a view to enhance their writing skills as well as make them aware of various ethical and environmental issues, social problems, current affairs etc. on the topics of which the writings are to be submitted.	

Books recommended in addition to the software installed in the systems with the objective to add to the students' knowledge of the different units of the syllabus and to aid them in interactive sessions:

1. Marks, Jonathan. *English Pronunciation in Use: Elementary.* Cambridge: CUP, 2009.
2. Hewings, M. *English Pronunciation in Use. Advanced.* Cambridge: CUP, 2009.
3. Rottanji. *A Book on Silent Letters in English*. Web
4. *English Language Communication Skills (ELCS) Lab Manual- cum-Work Book.* NewDelhi: Cengage Learning India Pvt., 2013.
5. Murphy, Raymond. *Essential English Grammar: A Self Study Reference and Practice*

***Book for Elementary Students of English 2nd edition*. Cambridge: CUP.**

Hewings, Martin. *Advanced English Grammar: A Self Study Reference and Practice Book for Advanced South Asian Students*. Cambridge: CUP.

Reference Books:

1. Merriam-Webster. *The Merriam-Webster Dictionary of Synonyms and Antonyms*. US: Merriam-Webster.1984.
2. Gulland, Daphne M and David G. Hinds- Howell. *Dictionary of English Idioms 2nd Revised Edition*. UK: Penguin. 2001.
3. Kumar, Sanjay and PushpLata. *Communication Skills, Second* Edition. OUP. 2015.
4. Chin, Peter, Samuel Reid et al. *Academic Writing Skills Student's Book 2*. Cambridge: CUP.
5. Cholji, Mark. Towards Academic English: Developing Effective Writing Skills.
6. Cambridge: CUP.
7. *Spoken English* (CIEFL) in 3 volumes with 6 cassettes, OUP.

COURSE	**:**	**CHEMISTRY-101 LAB**
Course Code	:	**CY181111**
Credit	:	**1**
L-T-P	:	0-0-2
SEE	:	50 Marks

Detailed Syllabus

Exp. No	Experiment
1	Determination of surface tension of a given liquid at room temperature by Stalagmometer.
2	Determination Co-efficient of viscosity of a given liquid at room temperature by Ostwald's Viscometer.
3	Measurement of conductivity of an Electrolyte.
4	Determination of pH of strong and weak acid & bases by using pH meter.
5	Determination of available chlorine in bleaching powder.
6	Determination of total hardness of water by EDTA method.
7	Estimation of percentage of copper in brass sample.
8	Estimation of iron.
9	Salt analysis.
10	Separation of components of a mixture by paper chromatography.

Reference books:

1. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R.C. Denny, G. H. Jeffery, 4th Ed.
2. Practical Engineering chemistry by Sunitha and Rathna.

COURSE : BASIC ELECTRICAL ENGINEERING LAB
Course Code : **EE181117**
Credit : **1**
L-T-P : 0-0-2

Detailed syllabus

Exp. No	Laboratory
1	Basic safety precautions, Introduction and use of measuring instruments.
2	Calibration of measuring instruments.
3	Verification of Thevenin's Theorem.
4	Verification of Maximum Power Transfer Theorem.
5	Measurement of power in a single phase AC circuit using Wattmeter.
6	Measurement of circuit parameters under steady-state condition for RLC circuits.
7	Demonstration of cut-out sections of Electrical Machines.
8	Characteristics of incandescent lamp.
9	Study of balanced three phase circuits.
10	Demonstration of layout of house wiring`
11	Demonstration of measurement of insulation resistance.

Text / References Books :

1. D. P. Kothari and I. J. Nagrath, ―Basic Electrical Engineering‖, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, ―Basic Electrical Engineering‖, McGraw Hill, 2009.
3. L. S. Bobrow, ―Fundamentals of Electrical Engineering‖, Oxford University Press, 2011.
4. E. Hughes, ―Electrical and Electronics Technology‖, Pearson, 2010.
5. V. D. Toro, ―Electrical Engineering Fundamentals‖, Prentice Hall India, 1989.
6. B. L. Theraja, A. K. Theraja, ―A Text Book of Electrical Technology Vol I, II, IV‖, S. Chand & Co., 2015.
7. Abhijit Chakrabarti, Sudipta Nath and Chandan Kumar Chanda, ―Basic Electrical Engineering‖, Tata McGraw-Hill, 2017

2. 2 Syllabus of B. Tech. 2nd Semester

COURSE : PHYSICS-201
Course Code : **H181201**
Credit : 4
L-T-P : 3-1-0

Detailed Syllabus

Module	Module Details	No. of Lectures
1	Mechanics: Conservative & non-conservative forces, Central forces, Conservation of angular momentum, Non-inertial frames of reference; Rotating co-ordinate system- Centripetal and Coriolis acceleration. (6)	17
2	Harmonic Oscillator, damped harmonic motion – over-damped, critically damped and under damped oscillators; forced oscillation and resonance.	5
3	Elasticity, Hooke's law, factors affecting elasticity, Poisson's ratio, Relations in elasticity, twisting couple on a wire, bending of beams with symmetric cross-section, Cantilever.	6
4	Fluid Mechanics: Bernoulli's Theorem and its important applications, Viscosity, Co-efficient of Viscosity, Streamline and Turbulent flow, Reynolds Number, Critical velocity, Poiseuille's equation for flow of liquid through a tube, Motion of a Rigid body in a viscous medium, Rotational viscometer.	5
5	Acoustics: Decibel level of sound, Weber–Fetchner law, Reverberation & Reverberation time, Sabine's formula for reverberation time (Derivation not required), Absorption co-efficient, Factors affecting acoustics of buildings and their remedies, Acoustic design of a hall. Production and properties of ultrasonic waves, Applications of Ultrasonic.	6
6	Optics Aberration in lenses, Spherical and Chromatic Aberration, Method of minimization of Spherical and Chromatic Aberration.	3
7	Nanomaterial and Advanced materials :Introduction to Nanomaterials, Properties of Nanomaterials, Potential Well and Quantum Confinement (qualitative), Types of Nanomaterials and their applications.	7
8	Advanced materials: Shape memory alloys and Biomaterials	

Note: *The syllabus of Physics PH181201 for Group A is designed as per the AICTEdirectives to teach different topics of Physics to different branches of Engineering to cater to their specific needs. However, in order to give the students a complete essence of Physics, the following topics may be taught in brief (maximum 4 hours) in tutorial classes, or may be encouraged to learn these topics by using online resources e.g. NPTEL lectures etc. and*

assignments may be given to ensure their learning. These topics, however, are not to be included in end semester examinations:

- Principle of production of LASER beams (Qualitative only), properties and uses of LASER beams;
- Classification of magnetic materials (qualitative only) and their properties;
- Definition of Electric Dipole, Dipole moment and Dielectric constant.

Text Books:

1. Engineering Physics – V. Rajendran (Tata McGraw Hill education Pvt. Limited)
2. Engineering Physics – D.K. Bhattacharya and Poonam Tandon (Oxford University Press)

Reference Books:

1. Elements of Properties Matter – D.S. Mathur (S. Chand and Company Pvt. Limited)
2. Applied Physics for Engineers – Neeraj Mehta (PHI Learning Pvt. Limited)

COURSE : MATHEMATICS-II
Course Code : **MA181202**
Credit : 4
L-T-P : 3-1-0

Detailed Syllabus

Module	Module Details	No. of Lectures
1	Differentiation of vectors, Gradient, Divergence and Curl, Directional Derivatives, Line, Surface and volume Integrals; Green, Gauss and Stokes Theorems (without proof) and their applications.	10
2	First order ordinary differential equations : Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.	6
3	Ordinary differential equations of higher orders: Second order linear differential equations with constant co-efficient, Power series solutions: Legendre Polynomials, Bessel functions of first kind and their properties.	10
4	Complex Variable – Differentiation: Differentiation, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Finding harmonic conjugate; Elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.	6
5	Complex Variable – Integration: Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without	8

	proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.	

Text Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

COURSE : ENGINEERING GRAPHICS AND DESIGN
Course Code : **CE181103**
Credit : **3**
L-T-P : 1-0-4

Detailed syllabus

Module	Module Details	No. of Lectures
1	Introduction to Engineering Drawing: 1. Principles of Engineering Graphics and their significance, usage of Drawing instruments. Lettering: Single stroke letter – Vertical and inclined capital and small letter, Scales: Plain scale and Vernier scale. Curves: Conic sections – Ellipse, parabola, hyperbola, different methods of construction of conic sections, tangents and normal to conics.	8
2	Orthographic Projections :Principles of Orthographic Projections-Conventions a. Projection of points: Introduction of projection, quadrants, 1st, 2nd, 3rd and 4th angle projection of points. b. Projection of lines (First angle only): Line parallel to one or both planes, line perpendicular to a plane, line inclined to one plane and parallel to other, line inclined to both plane.	14

	c. Projections of planes (First angle only): Plane perpendicular to one plane and parallel to other, plane perpendicular to both plane, plane inclined to one plane and perpendicular to other. d. Projection of solids (First angle only): Axis perpendicular to one plane and parallel to other, axis parallel to both plane, axis inclined to one plane and parallel to other, axis inclined to both plane.	
3	Sections and Sectional Views of Right Angular Solids: Section of solids: Section plane parallel to one plane and perpendicular to other, section plane inclined to one plane and perpendicular to other.	4
4	Isometric Projections :Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.	4
5	Introduction of Computer Graphics :Demonstrating knowledge of the theory of CAD software such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines(extend/lengthen). Drawing simple shapes such as circle, parabola, etc. Drawing geometric solids; Drawing annotation, solid, surface, and wireframe models.	6
6	Demonstration of simple team design (Students Project as group work) Creation of engineering models and their presentation in standard 2D blueprint form, 3D wire-frame and shaded solids; meshed topologies for engineering analysis. Drawing of floor plans, front elevation and sectional elevation showing floor level to ceiling of a simple two storied building with doors and windows.	4

NOTE: Assessment of student based on above syllabus comprises of three parts

a. Theory examination covering Module 1 to Module 4
b. Practical Examination covering Module 5
c. Project covering Module 6

Text/Reference Books:

1. Bhat, N.D.& M. Panchal (2008), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & B.C. Rana (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Dhawan, R.K. (2007), A Text Book of Engineering Drawing, S. Chand Publications

4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
5. Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

COURSE : ENGINEERING MECHANICS
Course Code : **E181104**
Credit : **3**
L-T-P : 3-0-0

Detailed Syllabus

Module	Module Details	No. of Lectures
1	Equilibrium of Rigid Bodies :Introduction, Free body diagram (FBD), Types of supports and their reactions, System of forces, Resultant of coplanar concurrent forces and non-concurrent force systems, Conditions of equilibrium, (i) concurrent forces in space (ii) non-concurrent forces in space.	6
2	Analysis of Structures: Method of joint, method of sections, graphical methods.	3
3	Friction: Introduction, laws of Coulombs friction, equilibrium of bodies involving dry friction; inclined plane, ladder friction, wedge friction.	3
4	Centre of Gravity and Moment of Inertia :Centre of gravity and centroid; location of centroid and centre of gravity (ii) Moment of inertia of plane area, Parallel axis theorem, perpendicular axis theorem, mass moment of inertia, polar moment of inertia, radius of gyration, product of inertia, M.I. of simple and composite bodies.	6
5	Lifting Machines: Introduction, Principles of machines, and reversibility of machines, lever, pulley, and simple wheel and axle.	4
6	Virtual Work and Energy Introduction, virtual displacement, principle of virtual work, application of virtual work.	4
7	Impulse, Momentum, Work and Energy: Linear impulse and momentum, Principle of work-energy conservation.	4

Text Books:

1. Engineering Mechanics by IH Shames, PHI.
2. Engineering Mechanics, Mariam and Craig, Wiley.

Reference Books:

1. Engineering Mechanics by S. Timoshenko and D.H. Young, McGraw Hill Int.
2. Engineering Mechanics by R.K. Banshal, Laxmi Publication (P) Ltd.
3. Engineering Mechanics by K.L. Kumar, McGraw Publishing Co.\
4. Engineering Mechanics by Hibbler.

5. Engineering Mechanics by D.P Sharma, Pearson.
6. Engineering Mechanics Statics and Dynamics by A Nelson, McGraw Hill.
7. Engineering Mechanics by S.S. Bhavikatti, New Age International Publishers.

COURSE : SOCIOLOGY
Course Code : **HS181105**
Credit : **2**
L-T-P : 2-0-0

Detailed Syllabus

Module	Module Details	No. of Lectures
1	Understanding of Sociology: Introduction to sociology: Meaning and definition of sociology, nature and scope of sociology, significance of sociology; understanding of society and social institutions: family, community, group, culture and civilization, marriage, family, religion.	5
2	Gender and Society: Concept of gender, differences between sex and gender, changing gender roles in society, gender equality and inequality, gender and poverty, gender discrimination.	4
3	Social Change: Meaning and definition of social change, nature and characteristics of social change, modernization, industrialization, information and technology. Social disorganization and social problems (over population, poverty, unemployment, corruption and black money.	5
4	Industrial Disputes: Meaning and definition of industrial disputes, causes and methods of settlement of industrial disputes. Trade union-definition of trade union, functions of trade union, problems of trade union in India. Indian factories Act, 1948.	5
5	Human Resources: Meaning of human resources, significance of human resources, meaning of manpower planning, concept of productivity, factors of productivity, factors affecting productivity, workers' participation in management, unilateral and cooperative participation.	5

Textbooks/ References:

1. C.N. Shankar Rao: Principles of Sociology, New Delhi: S.Chand& Co. Ltd., 2006.
2. Mamoria C.B. ,Mamoria S and Gankar. Dynamics of Industrial Relations in India, Himalaya Publishing House, New Delhi.
3. John, Mary E. Women's studies in India. New Delhi: Penguin, 2008.
4. Tong, R. Feminist Thought. Colorado: Westview Press, 2009.
5. Ram Ahuja - Social Problems in India, Jaipur: Rawat Publications, 2001.
6. M.N.Srinivas: Caste in Modern India, Oxford University Press, 1992.
7. Principles of Sociolgy by R.N. Sharma.
8. Labour problems and social welfare by R.C.Saxena.

9. Labour problems and social welfare by U.C.Kulshrestha.

COURSE : PHYSICS-201 LAB
Course Code : **PH181211**
Credit : **1**
L-T-P : 0-0-2

Detailed Syllabus

Ex. No	Experiments
1	To find the value of the modulus of rigidity of the material of a rod by using: Vertical Twisting apparatus / Horizontal Twisting apparatus.
2	To find the Moment of Inertia of a given body by using the Moment of Inertia Table.
3	To find the coefficient of viscosity of water by capillary flow method.
4	To find the refractive index of the material of a prism using a spectrometer (by finding the angle of the prism and the angle of minimum deviation of the prism).
5	To find the specific heat of a given liquid by the method of cooling.
6	To find the ratio of two low resistances by using a potentiometer.
7	To find the average resistance of the Meter Bridge wire by Carey Foster's method.
8	To find the refractive index of water by using a convex lens and a mirror.
9	Determination of Planck's constant. To find the velocity of ultrasonic waves in a given liquid.

Text Books:

1. A Text Book on Practical Physics – K.G. Mazumdar and B. Ghosh (Sreedhar Publishers).
2. A Text book of Practical Physics - Samir Kumar Ghosh (New Central Book Agency).

COURSE : ENGINEERING MECHANICS LAB
Course Code : **ME181114**
Credit : **1**
L-T-P : 0-0-2

Detailed Syllabus

Ex. No	Experiment
1	To verify the law of polygon of forces for a numbers of coplanar forces in equilibrium.
2	Parallel Forces Apparatus: A. To show experimentally the inverse relationship between reactive forces at support and the distance of the point of application of loads from supports. B. To find the reactive forces at the supports using: (i) Experimentally, (ii) Analytical method

3	Rolling Friction Apparatus: Experimental Computation of Co-Efficient of Friction between an Inclined Plane (Glass) and Trolley (Iron).
4	Square Threaded Screw Jack: A. To determine the Velocity Ratio, Mechanical Advantage and Efficiency of a Square Threaded Screw Jack B. To construct the Curves showing relations of P – W, MA – W, η - W.
5	To verify the Law of Moments by using a Bell Crank Lever
6	To verify the equilibrium of forces with the help of force polygon apparatus
7	To determine the co-efficient of friction between the slider and the inclined plane (sliding friction).

COURSE : WORKSHOP
Course Code : **ME181216**
Credit : **2**
L-T-P : 0-0-4

Detailed Syllabus

Ex. No	Experiments
1	**Lathe:** **(a) Lathe** –Functions, Classification and Specification, Different parts, Drivemechanisms for speed, feed, depth of cut, Taper turning, other operations, Machining time. Lathe accessories and Attachments. (b) **Semi-Automatics –** Capstan and Turret Lathes–Different parts–Tools–Work andTool holding devices. Indexing and Bar Feeding mechanism, Tool layout and Tool schedule chart.
2	**Shaper, Planar, Slotting and Broaching Operations** **(a) Shaper -** Function, Classification and Specification, Different part of a shaper–Quick return and feed mechanism – Shaper Operations, Cutting speed and Machining time calculations. **(b) Planar -** Function, Classification and Specification, Difference between shaper andplanar - Table drives and field mechanism – Planar operations – Machining time. **(c) Broaching –** Purpose, Broaching tool and machine (d) **Slotting Machine –** Purpose, Slotting tool and machine.
3	**Drilling:** (a) Drilling machines – Classification – Specification – Parts drilling machine – Spindle drive mechanism – tool and work holding devices. (b) Types of Drills and twist drill nomenclature, drill size and designation of drills. (c) Deep hole drilling operation. (d) Speed, feed and depth of cut and machining time in drilling. (e) Reaming operation, Reaming tools, Reaming allowances. (f) Tapping operation, tap drill size, difference with die (solid and adjustable).

4	**Milling:** Introduction – Classification – Principal parts of a column and knee type Milling machine – Specifications, Spindle drive and feed mechanism, elements of a milling cutter, Milling processes – Up Milling – down milling – face milling – end milling, cutting speed, feed and depth of cut – machining time, indexing and dividing head, indexing methods, spur and helical gear milling operations – Selection of cutter for gear cutting.
5	**Grinding:** Introduction – Kinds of Grinding – Grinding processes – Centerless Grinders – Surface Grinders – Tool and cutter Grinder – Specification Grinding wheel – Abrasives – Bonding Processes – Grid , Grade and Structure – Marking System of Grinding wheel – Selection of Grinding wheel, Mounting, Dressing, Truing and Balancing of grinding wheel.
6	**Pattern making and Foundry:** Pattern making and sand casting – Pattern materials – Types – Pattern allowances, Coreprints, Moulding sand – Ingredients – Classification – Sand additives – Properties of Moulding sand – Sand preparation and testing, Green sand mould preparations, Cores and core making – Types of Cores.

Text Books:

1. Elements of Workshop Technology – Vol. I and II, S.K. HajraChoudhury and A.K. HajraChoudhury.
2. A course in Workshop Technology (Vol. I and Vol. II) – B.S, Raghuwanshi.
3. Manufacturing Technology – P.N. Rao – Tata McGraw Hill.
4. Workshop Technology – I – P.K. Sapra and R.K. Kapur – Bikas Publishing.
5. Elements of Manufacturing Processes – B.S. NagendraParasar and R.K. Mittal – PHI
6. Introduction to Machining Science – G.K. Lal, New Age International Ltd.